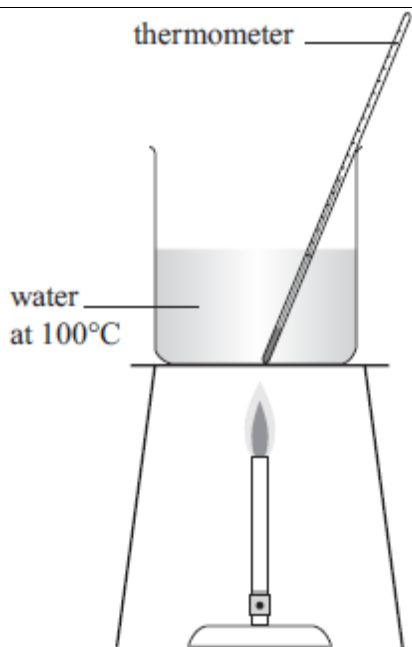


Calorimetry calculations

QUESTIONS: Carry out the following Calorimetry calculations

In your exam you will be provided with the SHC (Specific Heat Capacity) if needed: specific heat capacity of water = $4.18 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$



1) A student heats 72.0 g of water to 100°C using a Bunsen burner.

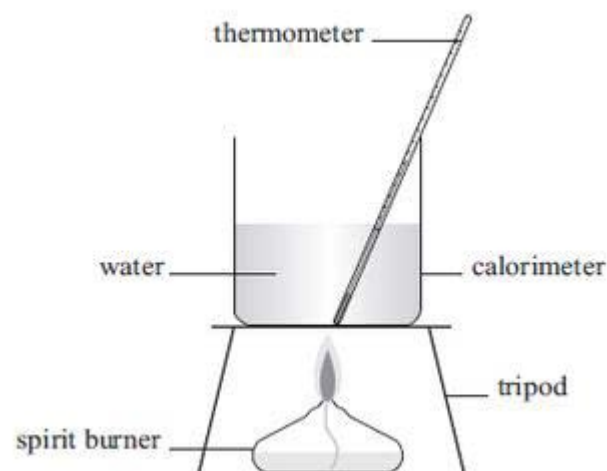
The student then boils the water.

Calculate the mass of methane gas, CH_4 , that would need to be combusted in a Bunsen burner to boil the 72.0 g of water.

$M(\text{H}_2\text{O}) = 18.0 \text{ g mol}^{-1}$.

In your answer you will need to:

- use **Equation Two** to determine the amount of energy required to boil the water
- use **Equation One** to determine the mass of methane needed to produce the required amount of energy
- assume that no energy is lost to the surrounding environment.



2) The apparatus below was used to determine the enthalpy of combustion of hexane. When 0.400 g of hexane was burned in the spirit burner, the temperature of 150 g of water was found to increase from 22°C to 39°C.

i) Calculate the experimental value of $\Delta_c H$ (C_6H_{14} , ℓ).

ii) Account for the difference between the experimental value and the value given in a data book as (- 4163 kJ mol⁻¹) AND suggest how this difference could be minimised.

3) Dissolving of ammonium nitrate in water is an endothermic process.

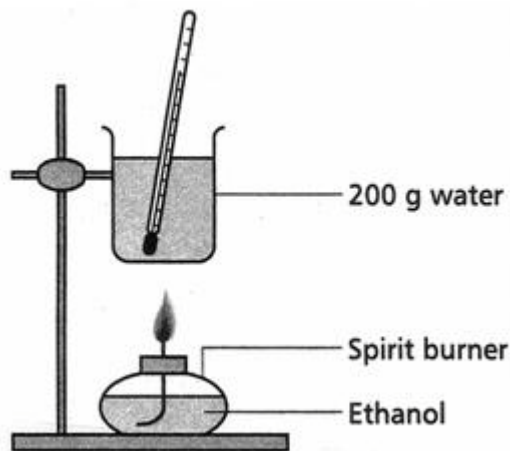


When 1.80 g of ammonium nitrate was dissolved in 50.0 g of water, the temperature decreased by 2.70°C.

(i) Calculate the enthalpy change when one mole of ammonium nitrate dissolves completely in water.

(ii) Calculate the mass of ammonium nitrate that would be required to absorb 1.25 kJ of energy.

4) The diagram below shows a simple calorimeter. It can be used to measure the enthalpy of combustion of ethanol, $\text{C}_2\text{H}_5\text{OH}$. If 1.00 g of ethanol is burned in the spirit burner, the temperature of the 200 g of water is found to increase from 22°C to 40°C . Using these results, calculate the experimental value of $\Delta_c H$ ($\text{C}_2\text{H}_5\text{OH}$, l).



Give two reasons why the experimental value for the enthalpy of combustion of ethanol calculated in part (a) is so much less than the 'accepted' value in data books